

A CONTRIBUTION TO
SAMOAN SOMATOLOGY

By LOUIS R. SULLIVAN

BASED ON THE FIELD STUDIES OF E. W. GIFFORD AND W. C. MCKERN


Memoirs of the Bernice Pauahi Bishop Museum
Volume VIII—Number 2

WITH PLATES XXV-XXX

BAYARD DOMINICK EXPEDITION

PUBLICATION NUMBER I

HONOLULU, HAWAII
BISHOP MUSEUM PRESS
1921



Digitized by the Internet Archive
in 2012 with funding from
Consortium of Church Libraries and Archives

A CONTRIBUTION TO SAMOAN SOMATOLOGY

By LOUIS R. SULLIVAN

Based on the field studies of E. W. Gifford and W. C. McKern.

INTRODUCTION

THE determination of the physical characters and of the racial affinities of the Polynesians is an essential part of the program of the Bayard Dominick Expedition. Through a coöperative arrangement between The American Museum of Natural History and the Bishop Museum this phase of the work, including detailed plans for field investigation and the analysis of results, has been placed in my hands. To insure uniformity of technique and consequent comparability of results, methods of taking measurements and of recording descriptive observations have been discussed with members of the Expedition, and so far as practicable actual field practice has been given under my direction.

The present paper is based on field studies made by E. W. Gifford and W. C. McKern while en route to the Tonga Islands. These men spent some time with me in Honolulu gaining familiarity with modern anthropometric methods, and I feel the greatest confidence in the care and accuracy with which their observations have been recorded. The photographs were taken by Mr. Gifford and Mr. McKern; the necessary mathematical computation including calculation of the indices were performed by my wife, Bessie P. Sullivan, and checked by me; and in the field Mrs. Delila S. Gifford rendered valuable assistance. The Museum acknowledges the cordial coöperation of Mr. R. W. Tate, Administrator of Western Samoa, of the officers of the Medical Department and the Department of Native Affairs, and of the Police.

Although the series is too small to permit detailed statistical analyses and inadequate as a bases for generalization, the present great dearth of somatological data from the Polynesian culture area makes this material a welcome and important contribution.

The data furnished by Gifford and McKern consists of body, head, and face measurements, accompanied by descriptive details of 100 natives of the Islands of Savaii and Upolu of the Samoan group. By nativity the persons measured represent nearly the entire coastal region of these two islands. Of the 100 measurements 7 were discarded because of admitted intermixture with European and Melanesian peoples or because of immaturity. Of the 93 remaining adults who claimed to be full Samoan, 70 are male and 23 female. It is possible or even probable that several others are not full Samoan, but this can not be demonstrated statistically. Types of full-blood and half-blood Samoans are shown in Plates XXV-XXX

CHARACTERS NOT QUANTITATIVELY MEASURABLE

SKIN COLOR

Skin color is very difficult to record accurately even with the help of color standards, all of which are admittedly inadequate. At the time this work was undertaken, von Luschan's "Hautfarben-Tafel," which is the most practical standard in use at present, was not available. Fritsch's standard, which is much less permanent and entirely impractical for field work, was therefore used, and the results were translated as nearly as possible into terms of von Luschan's scale. The observations were made in two places—an unexposed portion of the skin, preferably the inner side of the upper arm, and an exposed place, uniformly the cheek just below the zygomatic arches. For the unexposed skin the color ranges from number 10 to number 24 of von Luschan's scale, numbers 14, 15, and 16 predominate. In the women the shades run about one degree lighter and numbers 13, 14, and 15 predominate. For the exposed skin of the men numbers 15, 16, 17, or 18 predominate. Again, the color of the women runs about one shade lighter, in most being number 14, 15, or 16. In terms of black and white the color ranges from very light flesh yellow to deep brown. A slightly yellowish medium brown predominates.

HAIR

For hair form the following choice of adjectives was made: straight, low waves, deep waves, curly, frizzly, woolly. It was agreed not to judge by the general effect, but to examine individual hairs. In addition hair samples were collected and the results checked up in the laboratory. The conception of the various terms agreed upon correspond to the following letters in Martin's *Schema der Haarform*, ("Lehrbuch der Anthropologie," fig. 52, page 189): straight=a, b, c; low waves=d; deep waves=e; curly=f; frizzly no equal, but refers to the fine deep waves so common where intermixture with woolly-haired people has taken place: woolly=g, h, i; tufted or spiral=k, l.

The chief differences are due to the fact that our classification was not so minute as Martin's and that we distinguished between fine straight hair and wavy hair. The results are shown in Table I.

The choice of terms for hair color was black, dark brown, reddish brown, light brown, blond, golden, red, gray. Attention was given to the prevalence of customs of artificial bleaching. The results show that the practice of bleaching the hair with lime is still in vogue to some extent. The details are given in Table II.

TABLE I. HAIR FORM

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Straight	38	55.1	11	47.8
Low waves	19	27.5	9	39.1
Deep waves	7	10.1	2	8.8
Curly	4	5.8	0	.0
Frizzly	1	1.4	1	4.3
Woolly	0	.0	0	.0
Total	69		23	

TABLE II. HAIR COLOR

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Black	64	91.4	13	56.9
Dark brown.....	3(2) ¹	4.3(2.8)	2(4)	8.8(17.4)
Reddish brown.....	0	.0	0(3)	.0(13.0)
Light brown.....	0(1)	.0(1.4)	0(1)	.0(4.3)
Blond.....	0	.0	0	.0
Golden.....	0	.0	0	.0
Red.....	0	.0	0	.0
Gray	0	.0	0	.0
Total.....	70		23	

The amount and distribution of the beard was carefully noted. The choice of terminology was: none, scant, medium, heavy. The beard was considered as divided into three parts: upper cheek (from the hair line to an imaginary line bisecting the angle of the mandible), lower cheek (from the point where the imaginary line bisects the angle of the mandible to a point immediately below the corner of the mouth), and the chin. The observations resulted as follows:

TABLE III. BEARD: UPPER CHEEK—MALES ONLY.

	Number persons	Per cent
None	7	10.1
Scant	32	46.3
Medium	22	31.9
Heavy	8	11.5
Total	69	

TABLE IV. BEARD: LOWER CHEEK—MALES ONLY.

	Number persons	Per cent
None	10	14.5
Scant	30	43.3
Medium	16	23.2
Heavy	13	18.8
Total	69	

TABLE V. BEARD: CHIN—MALES ONLY.

	Number persons	Per cent
None	00	.0
Scant	16	23.2
Medium	19	27.5
Heavy	34	49.2
Total	69	

TABLE VI. HAIR ON CHEST—MALES ONLY.

	Number persons	Per cent
None	40	59.7
Scant	15	22.3
Medium	10	14.9
Heavy	2	3.0
Total	67	

TABLE VII. HAIR ON FOREARM—MALES ONLY

	Number persons	Per cent
None	2	3.0
Scant	13	19.1
Medium	24	35.3
Heavy	29	42.6
Total	68	

TABLE VIII. HAIR ON LEGS—MALES ONLY.

	Number persons	Per cent
None	0	.0
Scant	5	7.2
Medium	29	42.0
Heavy	35	50.7
Total	69	

¹ The figures in parentheses show the numbers and averages for lime-bleached hair.

EYE

The following descriptive terms were used for eye color: black, dark brown, light brown, blue, gray, blue-brown, gray-brown. Black was used for the very heavily pigmented brown eye which on casual examination appears black. Blue-brown and gray-brown were employed to designate those very light brown eyes which are often termed green or hazel. The basic color is either a blue or a gray with a discontinuous distribution of brown pigment either radiating from around the pupil or distributed in specks throughout the iris.

TABLE IX. EYE COLOR.

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Black	2	2.9	3	13.0
Dark brown	67	97.1	19	82.6
Light brown	0	.0	1	4.3
Blue	0	.0	0	.0
Gray	0	.0	0	.0
Blue-brown	0	.0	0	.0
Gray-brown	0	.0	0	.0
Total	69		23	

The terminology used to designate the condition of the conjunctiva was clear, speckled, yellow, dull, blood-shot. It was found, however, that with the exception of "clear" all the other terms might sometimes be applied to a single eye. For this reason the data have been tabulated under two heads only, "clear," and "unclear," unclear including speckled, yellow, and dull muddy eyes. "Blood-shot" was not represented.

TABLE X. CONDITION OF CONJUNCTIVA

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Clear	16	23.5	10	45.4
Unclear	52	76.5	12	54.6
Total	68		22	

TABLE XI. THE MONGOLOID OR EPICANTHIC EYE FOLD

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Absent	47	68.1	11	47.8
Trace	19	27.5	10	43.4
Medium	2	2.8	2	8.8
Marked	1	1.4	0	.0
Total	69		23	

NOSE

The elevation of the nasal bridge from the face was estimated in terms of low, medium or high. The European nose was the conception of high. As a rule the contour of the nostrils in man is nearly oval. The method adopted in describing the nostrils is based on an imaginary long axis through the oval and its orientation in relation to the facial plane. In most Europeans the long axes of the nostrils point directly forward in an antero-posterior direction from the facial plane

(fig. 1, *A*). In negroes the long axis runs parallel to the plane of the face in a transverse direction (fig. 1, *C*). In mongoloid peoples the axes point obliquely forward (fig. 1, *B*).

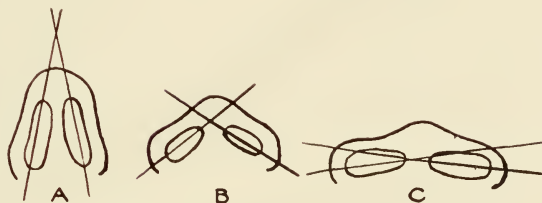


FIGURE 1. Types of nostrils: *A*, antero-posterior; *B*, oblique; *C*, transverse.

TABLE XII. NASAL BRIDGE

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Low	15	21.4	13	56.9
Medium	45	64.3	9	39.1
High	10	14.3	1	4.3
Total	70		23	

TABLE XIII. DIRECTION OF THE LONG AXIS OF THE NOSTRILS

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Antero-posterior..	2	2.9	0	.0
Oblique	39	57.3	9	39.1
Transverse	27	39.7	14	60.9
Total	69		23	

EAR

The terminology used for the ear lobe was: none, small separate, small attached, large separate, large attached. The distribution follows:

TABLE XIV. EAR LOBE

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
None	7	10.4	0	.0
Small separate	26	38.8	6	26.1
Small attached	23	34.3	13	56.5
Large separate	10	14.9	3	13.0
Large attached	1	1.4	1	4.3
Total	67		23	

The extent of the roll of the helix of the ear was noted. The helix was roughly divided into three parts designated as the first-third, the second-third, and the total helix. The first-third refers to that portion of the helix terminating in the vicinity of the superaurale, the second-third extends from this point to a point just below the position of the tuberculare.

TABLE XV. ROLL OF THE HELIX

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Helix flat	0	.0	0	.0
Helix rolled thru first-third	13	19.4	11	47.8
Helix rolled thru second-third	30	44.7	7	30.4
Helix rolled thru entire	24	35.8	5	21.7
Total	67		23	

TABLE XVI. DARWIN'S TUBERCLE

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Absent	53	81.5	18	78.2
Present	12	18.4	5	21.7
Total	65		23	

(Only well-marked tubercles were recorded.)

TEETH

The upper incisor teeth were examined for the purpose of noting the presence or absence of that type which Hrdlicka has aptly described as "shovel-shaped." The peculiarity referred to is located on the lingual surface of the upper incisor teeth. An upgrowth from the cingulum branches near the gingival border and extends along the lateral and mesial border of the tooth, forming a rim and leaving a concavity or depression in the lingual surface. The lingual surface of such a tooth presents an appearance not unlike that of a coal shovel. Examples of this type of tooth are most often found in American Indians, Malays, Chinese, Japanese, Koreans, and other Mongoloid types.

TABLE XVII. SHOVEL-SHAPED UPPER INCISORS

MESIAL INCISORS					LATERAL INCISORS				
	Male		Female			Male		Female	
	Number persons	Per cent	Number persons	Per cent		Number persons	Per cent	Number persons	Per cent
Absent	45	68.2	16	76.2	Absent	33	51.5	12	57.1
Trace	17	25.7	3	14.3	Trace	22	34.3	5	23.8
Marked	4	6.0	2	9.5	Marked	9	14.1	4	19.0
Total	66		21		Total	64		21	

TABLE XVIII. SLOPE OF THE FOREHEAD

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Vertical	29	40.0	18	85.7
Moderate slope	41	58.5	3	14.3
Low	1	1.5	0	0
Total	71		21	

TABLE XIX. DEVELOPMENT OF THE GLABELLA

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Smooth	20	29.4	23	100.0
Medium	38	55.8	0	.0
Prominent	10	14.7	0	.0
Total	68		23	

TABLE XX. THICKNESS OF THE LIPS

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
Thin	0	.0	1	4.3
Medium	65	92.8	21	91.4
Thick	5	7.1	1	4.3
Total	70		23	

TABLE XXI. PROGNATHISM—UPPER FACIAL PROFILE

	Male		Female	
	Number persons	Per cent	Number persons	Per cent
None	38	56.7	16	69.6
Slight	16	23.8	3	13.0
Medium	12	17.8	4	17.4
Marked	1	1.4	0	.0
Total	67		23	

ABSOLUTE MEASUREMENTS

TABLE XXII
STATURE (WITHOUT SHOES)

Centimeters	Number male	Number female
155	....	2
6	....	2
7	....	1
8	....	2
9	....	1
160	....	4
1	....	1
2	4	5
3	0	1
4	1	0
165	3	0
6	6	2
7	5	0
8	1	0
9	6	0
170	1	1
1	4	0
2	6	0
3	6	0
4	4	0
175	4	0
6	6	0
7	2	1
8	3	....
9	2	....
180	2	....
1	0	....
2	2	....
3	0	....
4	1	....
Total	69	23
Average	171.7	161.2
S.D.	5.25	4.92
E.	0.63	1.02
V. in per cent	3.05	3.05

TABLE XXIII
MAXIMUM HEAD LENGTH
(GLABELLA-OPISTHO-CRANIUM)

Millimeters	Number male	Number female
173	....	1
4	1	1
175	0	0
6	0	0
7	1	0
8	0	3
9	0	1
180	0	0
1	1	2
2	1	4
3	2	2
4	2	2
185	5	0
6	4	2
7	3	0
8	3	2
9	5	0
190	5	1
1	4	0
2	3	1
3	7	0
4	4	0
195	4	1
6	5	....
7	1	....
8	3	....
9	1	....
200	0	....
1	1	....
2	0	....
3	1	....
4	0	....
205	1	....
Total	68	23
Average	190.6	183.0
S.D.	5.69	5.22
E.	.69	1.08
V. in per cent	2.98	2.85

TABLE XXIV
MAXIMUM HEAD WIDTH

Millimeters	Number male	Number female
140	....	1
1	....	1
2	....	0
3	1	2
4	0	1
145	0	0
6	2	4
7	1	5
8	3	0
9	2	2
150	4	2
1	2	1
2	2	0
3	7	1
4	5	1
155	8	1
6	5	0
7	9	1
8	5	....
9	3	....
160	3	....
1	3	....
2	1	....
3	0	....
4	0	....
165	1	....
6	1	....
7	....	....
8	....	....
9	....	....
Total	68	23
Average	154.8	148.1
S.D.	4.46	3.87
E.	.54	.80
V. in per cent	2.88	2.61

TABLE XXV

MINIMUM FRONTAL DIAMETER

Millimeters	Number male	Number female
90	1	....
1	1	....
2	2	....
3	2	....
4	1	....
<hr/>		
95	2	2
6	1	1
7	1	2
8	1	1
9	3	1
<hr/>		
100	5	3
1	5	1
2	5	2
3	2	0
4	4	3
<hr/>		
105	3	3
6	6	1
7	7	2
8	4	1
9	1	0
<hr/>		
110	3	....
11	4	....
12	0	....
13	1	....
14	2	....
<hr/>		
115	0	....
16	0	....
17	0	....
18	1	....
19	0	....
<hr/>		

	Male	Female
Total	68	23
Average	103.4	101.5
S.D.	5.98	3.96
E. ....	.72	.82
V. in per cent	5.78	3.90

TABLE XXVI

MAXIMUM FACE WIDTH
(BIZYGOMATIC DIAMETER)

Millimeters	Number male	Number female
130	....	0
1	....	1
2	....	3
3	....	3
4	....	1
<hr/>		
135	0	1
6	1	4
7	1	1
8	5	3
9	2	1
<hr/>		
140	3	2
1	4	0
2	2	0
3	5	2
4	6	0
<hr/>		
145	7	1
6	5	....
7	4	....
8	6	....
9	0	....
<hr/>		
150	3	....
1	5	....
2	1	....
3	3	....
4	1	....
<hr/>		
155	0	....
6	3	....
7	0	....
8	1	....
9	1	....
<hr/>		

	Male	Female
Total	69	23
Average	145.9	136.5
S.D.	5.23	3.79
E. ....	.63	.79
V. in per cent	3.59	2.77

TABLE XXVII

BIGONIAL DIAMETER

Millimeters	Number male	Number female
89	....	1
<hr/>		
90	....	0
1	....	0
2	1	1
3	0	0
4	1	1
<hr/>		
95	0	1
6	3	1
7	1	3
8	5	0
9	4	2
<hr/>		
100	5	5
1	4	2
2	2	2
3	4	1
4	2	1
<hr/>		
105	4	2
6	8	....
7	4	....
8	4	....
9	3	....
<hr/>		
110	4	....
11	0	....
12	3	....
13	0	....
14	1	....
<hr/>		
115	1	....
16	1	....
17	1	....
18	0	....
19	0	....
<hr/>		

	Male	Female
Total	67	23
Average	104.6	99.0
S.D.	5.13	3.93
E. ....	.62	.82
V. in per cent	4.90	3.96

TABLE XXVIII. ANATOMICAL FACE HEIGHT
(NASION TO GNATHION)

Millimeters	Number male	Number female
110	....	1
11	....	1
12	....	0
13	....	0
14	....	1
<hr/>		
115	1	1
16	0	3
17	0	0
18	1	2
19	0	1
<hr/>		
120	1	2
1	1	1
2	2	2
3	3	0
4	4	1
<hr/>		
125	3	1
6	5	1
7	2	1
8	1	1
9	4	1
<hr/>		
130	2	0
1	5	0
2	3	0
3	5	1
4	3	0
<hr/>		
135	5	1
6	6	....
7	2	....
8	1	....
9	0	....
<hr/>		
140	2	....
1	2	....
2	2	....
3	2	....
4	0	....
<hr/>		
145	1	....
<hr/>		
Total	Male	Female
Average	69	23
S.D.	131.1	121.1
E.	6.56	6.41
V. in per cent .....	.79	1.33
	5.00	5.30

TABLE XXIX. NOSE HEIGHT
(NASION TO SUBNASALE)

Millimeters	Number male	Number female
45	....	1
6	....	0
7	....	0
8	....	1
9	....	1
<hr/>		
50	0	2
1	1	1
2	2	1
3	1	4
4	1	2
<hr/>		
55	3	2
6	2	2
7	4	0
8	10	0
9	7	2
<hr/>		
60	11	1
1	10	1
2	5	2
3	2	....
4	2	....
<hr/>		
65	3	....
6	2	....
7	0	....
8	2	....
9	1	....
<hr/>		
Total	Male	Female
Average	69	23
S.D.	59.8	54.3
E.	3.64	4.53
V. in per cent .....	.43	.94
	6.09	8.34

TABLE XXX
NASAL WIDTH (MAXIMUM DISTAL)

Millimeters	Number male	Number female
34	....	1
35	....	0
6	....	0
7	....	0
8	1	1
9	1	0
40	5	9
1	6	4
2	9	3
3	12	0
4	9	1
45	9	3
6	7	1
7	3	....
8	3	....
9	3	....
50	1	....
Male		Female
Total	69	23
Average	43.8	41.2
S.D.	2.59	2.56
E. ....	.31	.90
V. in per cent	5.91	6.21

TABLE XXXI
EAR HEIGHT (MAXIMUM TOTAL)

Millimeters	Number male	Number female
55	0	1
6	1	1
7	1	0
8	1	1
9	0	7
60	2	3
1	3	1
2	5	1
3	6	0
4	5	3
65	9	2
6	5	1
7	5	2
8	2	....
9	7	....
70	8	....
1	2	....
2	3	....
3	2	....
4	0	....
75	0	....
6	2	....
Male		Female
Total	69	23
Average	66.1	61.2
S.D.	4.23	3.33
E. ....	.50	.69
V. in per cent	6.39	5.44

TABLE XXXII
EAR WIDTH (MAXIMUM)

Millimeters	Number male	Number female
29	1	....
30	3	1
1	5	3
2	0	5
3	8	5
4	13	1
35	8	4
6	9	1
7	7	1
8	6	1
9	1	1
40	5	....
1	1	....
2	1	....
3	....	....
4	....	....
Male		Female
Total	68	23
Average	35.2	33.6
S.D.	2.76	2.30
E. ....	.33	.48
V. in per cent	7.84	6.84

INDICES AND PROPORTIONS

HEAD INDICES

TABLE XXXIII

CEPHALIC OR LENGTH-BREADTH INDEX

Index	Number male	Number female
74	2	....
75	2	0
6	1	3
7	6	1
8	7	4
9	0	0
80	11	0
1	7	3
2	9	4
3	5	4
4	4	2
85	5	1
6	3	1
7	4	....
8	0	....
9	2	....
<hr/>		
	Male	Female
Total	68	23
Average	81.3	80.8
S.D.	3.53	2.98
E. ....	.42	.62
V. in per cent	4.34	3.68

TABLE XXXIV

TRANSVERSE FRONTO-PARIETAL INDEX

(Minimum frontal $\times 100$)
(Maximum head width)

Index	Number male	Number female
55	....	....
6	....	....
7	1	....
8	1	....
9	1	....
60	3	....
1	0	....
2	1	....
3	5	1
4	6	0
65	5	2
6	6	4
7	7	2
8	9	3
9	11	2
70	3	1
1	2	2
2	2	2
3	3	2
4	2	2
<hr/>		
	Male	Female
Total	68	23
Average	66.8	68.8
S.D.	3.30	3.12
E. ....	.40	.65
V. in per cent	4.94	4.54

FACE INDICES

TABLE XXXV
CEPHALO-FACIAL INDEX
$$\left(\frac{\text{maximum face width} \times 100}{\text{maximum head width}} \right)$$

Index	Number male	Number female
85	0	....
6	1	....
7	0	....
8	2	1
9	1	2
<hr/>		
90	1	4
1	4	2
2	8	5
3	10	2
4	12	2
<hr/>		
95	8	1
6	7	2
7	7	1
8	3	1
9	2	0
<hr/>		
100	1	....
1	0	....
2	1	....
3	....	....
4	....	....
<hr/>		
	Male	Female
Total	68	23
Average	94.2	92.4
S.D.	2.84	2.63
E. ....	.34	.54
V. in per cent	3.01	2.84

TABLE XXXVI
JUGO-MANDIBULAR INDEX
$$\left(\frac{\text{bigonial diameter} \times 100}{\text{maximum face width}} \right)$$

Index	Number male	Number female
60	....	....
1	....	....
2	1	....
3	0	....
4	1	....
<hr/>		
65	2	....
6	1	....
7	3	2
8	7	4
9	4	1
<hr/>		
70	3	0
1	8	2
2	11	1
3	7	2
4	4	0
<hr/>		
75	5	5
6	3	5
7	2	0
8	2	1
9	2	0
<hr/>		
80	0	....
1	0	....
2	1	....
3	....	....
4	....	....
<hr/>		
	Male	Female
Total	67	23
Average	71.7	72.5
S.D.	3.84	3.50
E. ....	.46	.73
V. in per cent	5.42	4.83

TABLE XXXVII
JUGO-FRONTAL INDEX
$$\left(\frac{\text{minimum frontal diameter} \times 100}{\text{maximum face width}} \right)$$

Index	Number male	Number female
60	....	....
1	....	....
2	1	....
3	1	....
4	2	....
<hr/>		
65	1	....
6	3	....
7	2	....
8	6	....
9	6	1
<hr/>		
70	7	3
1	9	1
2	3	0
3	10	3
4	8	5
<hr/>		
75	5	3
6	1	2
7	0	0
8	2	2
9	1	0
<hr/>		
80	....	2
1	....	0
2	....	1
3	....	....
4	....	....
<hr/>		
	Male	Female
Total	68	23
Average	70.9	74.5
S.D.	3.55	3.34
E. ....	.43	.69
V. in per cent	5.01	4.49

TABLE XXXVIII
ANATOMICAL FACIAL INDEX
(GARSON)(anatomical face height $\times 100$)
(maximum face width)

Index	Number male	Number female
79	1	—
80	1	1
1	0	1
2	1	0
3	0	3
4	6	2
85	3	1
6	4	5
7	9	2
8	5	0
9	3	0
90	9	1
1	3	1
2	3	0
3	3	0
4	5	3
95	4	1
6	3	1
7	0	0
8	2	1
9	1	0
100	0	—
1	0	—
2	1	—
3	0	—
4	1	—
Male		Female
Total	68	23
Average	89.9	89.8
S.D.	4.87	5.03
E. ....	.59	1.05
V. in per cent	5.42	5.60

TABLE XXXIX
NASAL INDEX

Index Number male Number female

60	0	—
1	1	—
2	0	—
3	1	—
4	0	—
65	2	0
6	3	2
7	3	0
8	3	3
9	3	0
70	5	1
1	5	0
2	9	1
3	4	2
4	4	1
75	4	0
6	1	3
7	3	1
8	3	2
9	3	1
80	4	2
1	2	0
2	1	1
3	1	1
4	1	0
85	1	0
6	0	0
7	0	0
8	0	0
9	1	0
90	1	1
1	—	0
2	—	0
3	—	0
4	—	0
95	—	0
6	—	0
7	—	0
8	—	0
9	—	0
100	—	0
1	—	0
2	—	1
3	—	—
4	—	—

Male		Female
Total	69	23
Average	73.6	76.3
S.D.	5.86	7.99
E. ....	.70	1.66
V. in per cent	7.96	10.47

TABLE XL
PHYSIOGNOMIC EAR INDEX

Index Number male Number female

45	0	0
6	2	0
7	0	1
8	5	0
9	9	0
50	2	1
1	6	0
2	6	6
3	5	2
4	6	4
55	6	—
6	4	1
7	6	2
8	7	2
9	1	1
60	1	6
1	1	6
2	1	1
3	—	0
4	—	0
65	—	0
6	—	0
7	—	0
8	—	0
9	—	0
70	—	1
1	—	—
2	—	—
3	—	—
4	—	—
Male		Female
Total	68	23
Average	53.3	54.9
S.D.	3.79	4.53
E. ....	.46	.94
V. in per cent	7.11	8.25

SUMMARY OF SOMATOLOGICAL CHARACTERS OF SAMOANS

TABLE XLI. CHARACTERS NOT QUANTITATIVELY MEASURABLE

CHARACTER	MALE	FEMALE
Skin color (Unexposed part)	Medium yellowish-brown von Luschan's Nos. 14, 15, 16.	Medium yellowish brown von Luschan's Nos. 13, 14, 15.
Hair form	Straight 55.1% Low waves 27.5%	Straight 47.8% Low waves 39.1%
Hair color	Black 91.4	Black 56.9, dark brown 8.8 34.7% bleached
Amount of beard:		
Upper cheek	Scant 46.3, medium 31.9	
Lower cheek	Scant 43.3, medium 23.2	
Chin	Medium 27.5, heavy 49.2	
Amount of hair:		
Chest	None 59.7, scant 22.3	
Forearm	Medium 35.3, heavy 42.6.	
Leg	Medium 42.0, heavy 50.7	
Eye color	Dark brown 97.1	Black 13.0, dark brown 82.6
Conjunctiva	Speckled, yellowish 76.5	Speckled, yellowish 54.6
Epicanthic eye fold	Absent 68.1, trace 27.5	Absent 47.8, trace 43.4
Nasal bridge	Medium height 64.3	Low 56.9, medium 39.1
Long axes of nostrils	Oblique 57.3, transverse 39.7	Oblique 39.1, transverse 60.9
Slope of forehead	Vertical 40.0 Moderate slope 58.5	Vertical 85.7
Development of glabella	Medium 55.8	Smooth 100.0
Lips: thickness	Medium 92.8	Medium 91.4
Prognathism	None 56.7, slight 23.8	None 69.6, slight 13.0
Ear-lobe	Small: separate 38.8, Attached 34.3	Small: separate 26.1, Attached 56.5
Helix rolled	Two-thirds 44.7 Total 35.8	First-third 47.8 Two-thirds 30.4
Shovel-shaped incisor		
Tooth: Upper mesials	Absent 68.2, trace 25.7	Absent 76.2, trace 14.3
Upper laterals	Absent 51.5, trace 34.3	Absent 57.1, trace 23.8

TABLE XLII. ANTHROPOMETRIC CHARACTERS

CHARACTER	MALE 67 TO 70 PERSONS				FEMALE 20 TO 23 PERSONS			
	Average	E.	S.D.	V. in %	Average	E.	S.D.	V. in %
Stature (cm.)	171.7	.63	5.25	3.05	161.2	1.02	4.92	3.05
Head length (mm.)	190.6	.69	5.69	2.98	183.0	1.08	5.22	2.85
Head width	154.8	.54	4.46	2.88	148.1	.80	3.87	2.61
Minimum frontal diameter	103.4	.72	5.98	5.78	101.5	.82	3.96	3.90
Maximum face width	145.9	.63	5.23	3.59	136.5	.79	3.79	2.77
Bigonial diameter	104.6	.62	5.13	4.90	99.0	.82	3.93	3.96
Anatomical face height	131.1	.79	6.56	5.00	121.1	1.33	6.41	5.30
Nose height	59.8	.43	3.64	6.09	54.3	.94	4.53	8.34
Nose width	43.8	.31	2.59	5.91	41.2	.90	2.56	6.21
Ear height	66.1	.50	4.23	6.39	61.2	.69	3.33	5.44
Ear width	35.2	.33	2.76	7.84	33.6	.48	2.30	6.84
Cephalic index	81.3	.42	3.53	4.34	80.8	.62	2.98	3.68
Fronto-parietal index	66.8	.40	3.30	4.94	68.8	.65	3.12	4.54
Cephalo-facial index	94.2	.34	2.84	3.01	92.4	.54	2.63	2.84
Jugo-mandibular index	71.7	.46	3.84	5.42	72.5	.73	3.50	4.83
Jugo-frontal index	70.9	.43	3.55	5.01	74.5	.69	3.34	4.49
Anatomical face index	89.9	.59	4.87	5.42	89.8	1.05	5.03	5.60
Nasal index	73.6	.70	5.86	7.96	76.3	1.66	7.99	10.47
Physiognomic ear index	53.3	.46	3.79	7.11	54.9	.94	4.53	8.25

DISCUSSION

The results speak for themselves and need little discussion. Attention should be called to the fact that the average anatomical face height and the average nasal height as given in these tables stand very high in the total range for these two measurements. In fact they are among the very highest values so far recorded. As we have no comparative data on this matter and as these two dimensions are difficult to take, the results should be regarded as merely tentative. While it is obvious that the Polynesians have massive faces, it is not so obvious that they exceed all other peoples in these measurements. Although I have every confidence in the accuracy of these measurements as a whole, I am convinced from my own experience that when dealing with anatomical face height and nasal height a generous allowance must be made for individual differences in technique. The nasion is particularly hard to locate if the nasal bridge is low. As the amount of fleshy tissue on the chin varies considerably in different persons, the same degree of pressure may yield quite different results. Furthermore when taking face height it is absolutely necessary to be sure that the teeth are in proper occlusion, for even when the mouth is closed and the lips together, the teeth are not necessarily in occlusion. The non-occlusion of the teeth adds from 4 to 8 millimeters to the anatomical face height. While the probabilities are that these two measurements were properly taken, attention is called to these chances for mismeasurement.

As previously mentioned comparative data from Samoa is practically non-existent. Deniker, on the basis of 25 male Samoans, gives the average stature as 172.6 centimeters or slightly greater than our average of 171.7. His cephalic index is also somewhat higher—82.7 as compared with our 81.2. Our average is much lower than others previously recorded for this area. Deniker gives the

Tongan average as 82.6, Tahitian average 85.5, Marquesan average 85.5. Our average for the nasal index is very much lower than that of Collignon for Polynesians in general (73.6 and 89.8), but the discrepancy is probably due to a different technique.

Our series is noteworthy for its homogeneity. Taken character for character the variability is very small. As compared with a series of pure Sioux Indians and another series of Sioux-White half-bloods, the coefficient of variation for nearly every character is appreciably smaller than that of either of these groups.

TABLE XLIII. COEFFICIENT OF VARIATION—MALES ONLY

	Samoaan Pure	Sioux Pure	Sioux Half-bloods
Stature	3.05	3.27	3.92
Head length	2.98	3.16	2.72
Head width	2.88	3.47	3.20
Face width	3.59	3.65	3.83
Face height	5.00	5.12	5.23
Nasal height	6.09	6.75	6.48
Nasal width	5.91	8.07	8.08
Cephalic index	4.34	4.03	3.33
Cephalo-facial index	3.01	3.35	3.40
Facial index	5.42	5.78	6.22
Nasal index	7.96	10.25	10.23

Considering the group as a unit there seems to be very little Melanesian blood in evidence. On the basis of cultural or linguistic evidence it is common to assume a large amount of Melanesian blood in all Polynesian groups. If such blood exists it should be easily demonstrable. Melanesian intermixture should result in lower stature, longer heads, broader noses, shorter ears, more curly, frizzly, and woolly hair, a smaller transverse fronto-parietal index, a lower, narrower face, greater prognathism and a heavier development of the glabella and supra-orbital region. In none of these characters does this Samoan series approach very near to the prevailing Melanesian type or types.

As to the general affinities of the Samoans, it seems wiser to wait for more comparative data before taking any definite stand as to their relationships to other Polynesians or to mankind as a whole. In view of the fact that it is becoming more and more common to describe the Polynesians as of European racial affinities, it seems desirable to keep this point in mind in summarizing the facts brought out by the material from Samoa at hand. Frequently a single character is chosen as a criterion, but there is nothing in our available somatological data to warrant such procedure. If any one character is taken as a criterion and the classification carried out to the logical end on that basis, the results are ludicrous. More often than not it is naively assumed that nature has kindly provided us with absolute criteria of race. Some rely on hair form, some on nose form, while others prefer head form or skin color. Granting that all of these characters are valuable in their proper sphere, it is useless and futile to argue as to which is the most reliable test. While hair form might work admirably as a basis of classification for the greater part of mankind, it would just as probably lead astray if used inflexibly.

For the present it seems wiser to take into consideration the totality of characters available. To do otherwise is to assume the solution of our problem in advance. Our problem is not "On the assumption that hair form is an absolute test of race, to what race does the Samoan belong?" but rather, "In the light of all the available facts where shall we place the Samoan in the scale of mankind?"

Where we place him will also vary with our conception of the relationships of the various groups of mankind to one another. The prevailing classifications of mankind are the results of two schools of workers. One school is engaged in separating mankind into as many groups as possible, and the other in attempting to point out relationships and to include all mankind in the fewest groups possible. Since the same material is necessary to accomplish both of these ends, the work is equally valuable. In the end we shall doubtless concur in a happy medium.

For myself, I find no serious difficulty in assigning the greater proportion of mankind to one of four great races: the European or white, the Mongoloid or yellow-brown, the Negro, and the Australian.

With this conception of races and the material at hand as a basis I have attempted to analyze the somatological characters of the Samoans and to designate the race to which each character pointed. This designation of race does not mean that I believe or infer that the particular character referred to has had such an origin, but that, considering the range of each character for mankind as a whole, the detail in question most nearly approaches the average of the race designated. Naturally, many characters which vary indiscriminately from race to race and even within a given race have been omitted. In this list are included stature, cephalic index, and facial index, as well as several other characters on which we have insufficient data or knowledge for such determinations. The list follows:

TABLE XLIV. ANALYSIS OF SAMOAN CHARACTERISTICS

Racial Character	Affinities
Skin color	Mongoloid
Hair texture	European
Hair form	European
Hair color	Mongoloid-European
Eye color	Mongoloid
Conjunctiva	Mongoloid-Negroid
Amount of beard	Mongoloid
Hair on chest	Mongoloid
Hair on arms	European-Mongoloid
Hair on legs	European-Mongoloid
Absence of eye fold	European
Nasal bridge	Mongoloid-European
Nostrils	Mongoloid-Negroid
Lips	Mongoloid
Prognathism	European
Incisor teeth	European
Face width	Mongoloid
Bigonial diameter	Mongoloid
Jugo-frontal index	Mongoloid-European
Cephalo-facial index	Mongoloid
Nasal index	Mongoloid
Ear height	Mongoloid
Chin	Mongoloid
	Total Mongoloid
	European
	Mongoloid-European
	Mongoloid-Negroid
	11
	5
	5
	2

On the basis of this list I am inclined to regard the Samoans as most closely allied to the Mongoloid race of mankind, and to assume that the differences are probably due either to a slightly different evolution since the time of their separation and isolation from the parental stock, or to the retention in the Samoans of a primitive character which through different evolutionary processes has been lost in most of the Mongoloid types. I think it unlikely that the differences are due to racial intermixture. Take the single character of hair form for an example. When we think of Mongoloid hair, we invariably think of stiff, coarse, black hair, though as a matter of fact such hair is one extreme of the variation of hair form in man and most probably an end form in evolution. It seems more probable that the primitive hair form in man was at least slightly wavy, and that woolly and spiral hair present one end of an extreme specialization, and the coarse, stiff, straight hair the other end.

Another outstanding difference between the Samoans and Mongols in general is the low frequency of the shovel-shaped upper incisor tooth. On the other hand it seems reasonable to assume that the Polynesians at one time had this primitive Mongoloid characteristic and have lost it in part in their recent evolutionary history. The incisor teeth in this group have paralleled the tendency of the incisor teeth in European man and have become smaller in size. The absence of this incisor fold is due to a tendency in mankind to a reduction in dentition and is not the result of racial intermixture. My observation leads me to believe that the presence of this character is not one to disappear in mixed peoples. Certainly a fairly high percentage of the part-Hawaiian population have the incisor fold. In more than one Mongol group this characteristic is tending to disappear, if that can be inferred from lower frequency.

In conclusion we may say at least that it is far more difficult to reconcile European racial origin for the Samoans and Polynesians in general, than it is to assume Mongoloid affinities and origins.

Although the results of the present discussion must be considered as somewhat tentative because of the small amount of available data, it is nevertheless time that anthropologists should discontinue the practise of speaking vaguely of European origins for the Polynesians and begin to cite the specific characteristics that lead to their conclusions. Likewise there seems to be little benefit in referring to Melanesian admixture, unless we point out specifically and statistically those characters which point in this direction. It is not fair to assume that the facts upon which one's opinions are based are generally known. Scientists who have the privilege of working in inaccessible localities owe it to their colleagues to be as specific as possible in giving the reasons for their generalizations.



A. THREE SAMOAN MEN OF RANK; (1) AND (2) A CHIEF;
(3) AND (4) A JUDGE; (5) AND (6) AN ORATOR.



B. SAMOAN WOMEN.



4. MALE FULL-BLOOD SAMOANS.

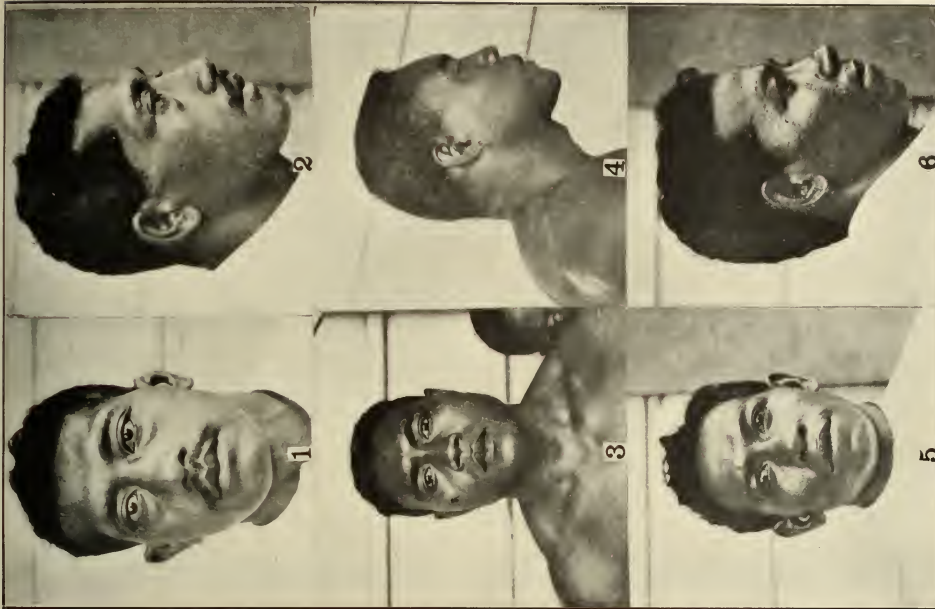
Photographs by Gifford and McKern.

B. MALE FULL-BLOOD SAMOANS.





A. MALE FULL-BLOOD SAMOANS.



B. MALE FULL-BLOOD SAMOANS.

Photographs by Gifford and McKern



A. MALE FULL-BLOOD SAMOANS.



B. MALE FULL-BLOOD SAMOANS.

Photographs by Gifford and McKern



A. MALE, FULL-BLOOD SAMOANS.



B. MALE, FULL-BLOOD SAMOANS.
Photographs by Gifford and McKern.



A. MALE FULL-BLOOD SAMOANS.



B. MIXED BLOOD SAMOANS: (1) AND (2) SAMOAN $\frac{1}{4}$, WHITE $\frac{3}{4}$; (3) AND (4) SAMOAN $\frac{3}{4}$, WHITE $\frac{1}{4}$; (5) AND (6) PART-SAMOAN.

Photographs by Gifford and McKern.

